

# **SmartMedia™ Physical Format Specifications**

## **Web-Online Version 1.00**

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SSFDC Forum Technical Committee

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## Revision History

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## 0. Introduction

This Specification defines the physical format of the SmartMedia™ (SSFDC or Solid State Floppy Disk Card) which is being introduced by the SSFDC Forum.

## 1. SmartMedia™ Memory Configuration

There are two SmartMedia™ memory configurations that differ in page size depending on the memory type (Flash Memory or MASK ROM), and the memory card capacity. For these two memory configurations, two kinds of physical format specifications have been provided.

The SmartMedia™ memory configurations are shown below:

- Flash Memory: There are 8 redundancy bytes for 256 data bytes.  
Permits data writing or reading page-by-page, and enables data erasing block-by-block.
- MASK ROM: No redundancy area. Permits data reading page-by page.

**Table 1-1 SmartMedia™ Memory Configurations (Flash Memory)**

| Model    | Page Size      | Block Size | Number of Blocks | Configuration | Device Code (3.3V model) | Device Code (5V model) |
|----------|----------------|------------|------------------|---------------|--------------------------|------------------------|
| 1 MBytes | 256 + 8 Bytes  | 16 Pages   | 256 Blocks       | Fig. 1-1      | 6Eh, E8h, ECh            | 6Eh                    |
| 2 MBytes |                |            | 512 Blocks       |               | EAh                      | 64h                    |
| 4 MBytes | 512 + 16 Bytes |            |                  | Fig. 1-2      | E3h, E5h                 | 6Bh, E5h               |
| 8 MBytes |                |            | 1,024 Blocks     |               | E6h                      | —                      |

**Table 1-2 SmartMedia™ Memory Configurations (MASK ROM)**

| Model    | Page Size                  | Block Size | Number of Blocks | Configuration | Device Code (3.3V model) |
|----------|----------------------------|------------|------------------|---------------|--------------------------|
| 2 MBytes | 512 + 16 Bytes<br>(Note 1) | 16 Pages   | 256 Blocks       | Fig. 1-2      | 5Dh                      |
| 4 MBytes |                            |            | 512 Blocks       |               | D5h                      |
| 8 MBytes |                            |            | 1,024 Blocks     |               | D6h                      |

Note 1: Outputs dummy data (all FFh) for data read (redundancy area).

Note 2: Block size is defined as 16 pages to keep Flash Memory compatibility.

Note 3: No 5 volt devices for Flash Memory (8 MBytes) and for all MASK ROMs, only 3.3 volt devices are available.

|           |          |                       |         |                          |
|-----------|----------|-----------------------|---------|--------------------------|
|           |          | 0                     | 255 256 | 263                      |
| Block 0   | Page 0   | Data area (256 Bytes) |         | Redundant area (8 Bytes) |
|           | Page 1   |                       |         |                          |
|           | :        |                       |         |                          |
|           | Page End |                       |         |                          |
| Block 1   | Page 0   |                       |         |                          |
|           | Page 1   |                       |         |                          |
|           | :        |                       |         |                          |
|           | Page End |                       |         |                          |
| :         | :        | :                     | :       | :                        |
| :         | :        | :                     | :       | :                        |
| :         | :        | :                     | :       | :                        |
| :         | :        | :                     | :       | :                        |
| :         | :        | :                     | :       | :                        |
| Block End | Page 0   |                       |         |                          |
|           | Page 1   |                       |         |                          |
|           | :        |                       |         |                          |
|           | Page End |                       |         |                          |

**Fig. 1-1 256+8 Bytes/Page Models**

|           |          |                       |         |                           |
|-----------|----------|-----------------------|---------|---------------------------|
|           |          | 0                     | 511 512 | 527                       |
| Block 0   | Page 0   | Data area (512 Bytes) |         | Redundant area (16 Bytes) |
|           | Page 1   |                       |         |                           |
|           | :        |                       |         |                           |
|           | Page End |                       |         |                           |
| Block 1   | Page 0   |                       |         |                           |
|           | Page 1   |                       |         |                           |
|           | :        |                       |         |                           |
|           | Page End |                       |         |                           |
| :         | :        | :                     | :       | :                         |
| :         | :        | :                     | :       | :                         |
| :         | :        | :                     | :       | :                         |
| :         | :        | :                     | :       | :                         |
| :         | :        | :                     | :       | :                         |
| :         | :        | :                     | :       | :                         |
| Block End | Page 0   |                       |         |                           |
|           | Page 1   |                       |         |                           |
|           | :        |                       |         |                           |
|           | Page End |                       |         |                           |

Note: Outputs dummy data (all “FFh”) for MASK ROM redundancy area.

**Fig. 1-2 512+16 Bytes/Page Models**

## 2. Physical Format Specifications

The physical format specifications are summarized below:

**Table 2-1 Summary of SmartMedia™ Physical Format Specifications (Flash Memory)**

| Model    | Formatted<br>(Bytes) | Unformatted<br>(Bytes) | Max Logical<br>Blocks | Logical<br>Block Size | Page Size<br>(Bytes) |
|----------|----------------------|------------------------|-----------------------|-----------------------|----------------------|
| 1 MByte  | 1,024,000            | 1,048,576              | 250                   | 4,096 Bytes           | 256+8                |
| 2 MBytes | 2,048,000            | 2,097,152              | 500                   |                       |                      |
| 4 MBytes | 4,096,000            | 4,194,304              |                       | 8,192 Bytes           | 512+16               |
| 8 MBytes | 8,192,000            | 8,388,608              | 1,000                 |                       |                      |

Note: Unformatted capacity and Formatted capacity does not include redundancy.

**Table 2-2 Summary of SmartMedia™ Physical Format Specifications (MASK ROM)**

| Model    | Formatted (Bytes) | Unformatted (Bytes) | Max Logical Blocks | Logical Block Size | Page Size (Bytes) |
|----------|-------------------|---------------------|--------------------|--------------------|-------------------|
| 2 MBytes | 2,048,000         | 2,097,152           | 250                | 8,192 Bytes        | 512 (+16)         |
| 4 MBytes | 4,096,000         | 4,194,304           | 500                |                    |                   |
| 8 MBytes | 8,192,000         | 8,388,608           | 1,000              |                    |                   |

Note: Since there is no defective blocks in MASK ROM, the Max Logical Block number can be greater than that of the Flash Memory. However, for format compatibility, the Max Logical Block and Flash Memory numbers are set to the same value.

## 2.1. Memory Space

- **Flash Memory**

In the SmartMedia™ (Flash Memory)'s memory space, data is configured as shown in Table 2-3 for 1-16 MBytes and in Table 2-4 for 32–128 MBytes.

**Table 2-3 Data Arrangement (Flash Memory: 1–16 MBytes)**

| Physical block No.   | Usage         |
|----------------------|---------------|
| 0                    | CIS/IDI Field |
| First to final block | Storing Area  |

Note: The CIS/IDI Field is placed in physical block 0.

If physical block 0 is found to be a defective block, the area is placed in the first normal block that is found after physical block 0.

Irrespective of the page size, only one block is assigned.

Normal blocks other than the CIS/IDI Field may be used as data areas.

The indication of a defective block and logical block arrangement in the data area will be set in the redundancy area as described hereinafter.

Regarding defective blocks:

- In the case of the 256+8 bytes/page models, the 6th byte (byte address 261st) in all odd-numbered pages in the redundant section contains two or more “0” bits to indicate a defective block.
- In the case of the 512+16 bytes/page models, the 6th byte (byte address 517th) in all pages in the redundant section contains two or more “0” bits to indicate a defective block.



## • MASK ROM

In the SmartMedia™ (MASK ROM)'s memory space, data is configured as shown in Table 2-4.

**Table 2-4 Data Arrangement (MASK ROM)**

| Physical block No.           | Usage         |
|------------------------------|---------------|
| 0                            | CIS/IDI Field |
| First to final block         | Storing Area  |
| Final block +1 to Last block | Reserved Area |

Note: The CIS/IDI Field is placed in physical block 0.

The relation of physical block and logical block is as follows;

$$(\text{logical block number}) = (\text{physical block number}) - 1$$

The data area is between physical block number 1 and the last data block number (the same value as Maximum logical blocks). The other areas are reserved and should be filled by FFh.

## 2.2. CIS/IDI Field

### For the 256+8 Bytes/page models (Flash Memory):

CIS/Identify Drive Information data is stored on the first two pages of the CIS/IDI Field. The configuration of this data is shown in Fig. 2-1.

The data that is referenced is written on page 0 and page 1. If the data on page 0 and page 1 is invalid, valid data may be written on page 2, 3 or on subsequent pages.

In the CIS/IDI Field, both the data and redundant areas are set to “FFh” for pages on which data has not yet been written.

#### • Data area

| Byte No. | Page 0      | Page 1      |
|----------|-------------|-------------|
| 0-127    | CIS Field-1 | CIS Field-2 |
| 128-255  | IDI Field-1 | IDI Field-2 |

#### • Redundant area

| Byte No. | Page 0                                   | Page 1        |
|----------|------------------------------------------|---------------|
| 256      | Function Select Information Field        | ECC Field-2   |
| 257      |                                          |               |
| 258      |                                          |               |
| 259      |                                          | 0000h (fixed) |
| 260      | Invalid Data Flag (Information Validity) |               |
| 261      | FFh (fixed)                              | ECC Field-1   |
| 262      | 0000h (fixed)                            |               |
| 263      |                                          |               |

**Fig.2-1 CIS/Identify Drive Information Data (256+8 Bytes/Page Models - Flash Memory)**

**For the 512+16 Bytes/page models (Flash Memory):**

CIS/Identify Drive Information data is written on the first page of the CIS/IDI Field. The configuration of this data is shown in Fig. 2-2.

The data that is referenced is written on page 0. If the data on page 0 is invalid, valid data may be written on page 1 or on subsequent pages.

In the CIS/IDI Field, both the data and redundant area are set to “FFh” for pages on which data has not yet been written.

**• Storing Area**

| Byte No. | Page 0      |
|----------|-------------|
| 0-127    | CIS Field-1 |
| 128-255  | IDI Field-1 |
| 256-383  | CIS Field-2 |
| 384-511  | IDI Field-2 |

**• Redundant area**

| Byte No. | Page 0                                   |
|----------|------------------------------------------|
| 512      | Function Select Information Field        |
| 513      |                                          |
| 514      |                                          |
| 515      |                                          |
| 516      | Invalid Data Flag (Information Validity) |
| 517      | FFh (fixed)                              |
| 518      | 0000h (fixed)                            |
| 519      |                                          |
| 520      | ECC Field-2                              |
| 521      |                                          |
| 522      |                                          |
| 523      | 0000h (fixed)                            |
| 524      |                                          |
| 525      | ECC Field-1                              |
| 526      |                                          |
| 527      |                                          |

**Fig. 2-2 CIS/Identify Drive Information Data (512+16 Bytes/Page Models – Flash ROM)**

**For the 512+16 Bytes/page models (MASK ROM):**

CIS/Identify Drive Information data is written on the first page of the CIS/IDI Field. The configuration of this data is shown in Fig. 2-3.

The data that is referenced is written on page 0.

Both the data and redundant areas in the CIS/Identify Drive Information area, other than on page 0, are set to “FFh”.

**• Storing Area**

| Byte No. | Page 0      |
|----------|-------------|
| 0-127    | CIS Field-1 |
| 128-255  | IDI Field-1 |
| 256-383  | CIS Field-2 |
| 384-511  | IDI Field-2 |

**• Redundant area**

| Byte No. | Page 0      |
|----------|-------------|
| 512      | FFh (fixed) |
| 513      | FFh (fixed) |
| 514      | FFh (fixed) |
| 515      | FFh (fixed) |
| 516      | FFh (fixed) |
| 517      | FFh (fixed) |
| 518      | FFh (fixed) |
| 519      | FFh (fixed) |
| 520      | FFh (fixed) |
| 521      | FFh (fixed) |
| 522      | FFh (fixed) |
| 523      | FFh (fixed) |
| 524      | FFh (fixed) |
| 525      | FFh (fixed) |
| 526      | FFh (fixed) |
| 527      | FFh (fixed) |

**Fig. 2-3 CIS/Identify Drive Information Data (512+16 Bytes/Page Models - MASK ROM)**

## 1. CIS Field

These fields store the data that is necessary to judge whether the formatting has been carried out in accordance with this Physical Format Specification.

To ensure the reliability of the data, the same data is stored in the following two areas: CIS Field-1 and CIS Field-2. The contents of the data are shown in Appendix 1.

The first 10 Bytes of this data serves as the basis on which a judgment is made on whether or not formatting has been done in accordance with this Format Specification.

If formatting has been done in accordance with this Format Specification, the values of the first 10 Bytes are as follows:

01h, 03h, D9h, 01h, FFh, 18h, 02h, DFh, 01h, 20h

## 2. IDI Field ( Identify Drive Information Field )

The data shown in Appendix 2 is stored.

To ensure the reliability of the data, the same data is stored in the following two areas: Identify Drive Information-1 and Identify Drive Information-2

## 3. Function Select Information Field

This field is provided for extensions. No data has been written yet.

The default value is "FFFFFFFFh" (fixed).

## 4. Invalid Data Flag

The purpose of this flag is to prove the validity of the CIS/Identify Drive Information data.

If the data is valid, "FFh" is written. If the data is invalid, "00h" is written and the CIS/Identify Drive Information data is stored on the next page.

In general, "FFh" is written. If correct data is not written in the data area, "00h" is set. If four or more bits are "0," the data shall be assumed to be synonymous with "00h."

## 5. ECC Field-1

In the case of the 256+8 bytes/page models, this area holds 3-byte ECCs (Error Correction Codes) for even-numbered page data (made up of 256 bytes).

In the case of the 512+16 bytes/page models, this area holds 3-byte ECCs for page data from byte 0 through byte 255 (made up of 256 bytes). For details on ECCs, see Appendix 3.

## 6. ECC Field-2

In the case of the 256+8 bytes/page models, this area holds 3-byte ECCs for odd-numbered page data (made up of 256 bytes).

In the case of the 512+16 bytes/page models, this area holds 3-byte ECCs for page data from byte 256 through byte 511 (made up of 256 bytes). For details on ECCs, see Appendix 3.

## 2.3. Storing Area

### For the 256+8 Bytes/page models (Flash Memory):

To manage data in 512-byte units, pages are handled in pairs. The internal data configurations of the data area are shown in Fig. 2-4.

Both the data and redundant sections in normal blocks on which no data has been written yet are set to “FFh”.

#### • Data area

| Byte No. | Even-numbered page | Odd-numbered page |
|----------|--------------------|-------------------|
| 0-255    | Storing Area-1     | Storing Area-2    |

#### • Redundant area

| Byte No. | Even-numbered page    | Odd-numbered page     |
|----------|-----------------------|-----------------------|
| 256      | Reserved Field        | ECC Field-2           |
| 257      |                       |                       |
| 258      |                       |                       |
| 259      |                       | Block Address Field-2 |
| 260      | Data Status Byte      |                       |
| 261      | Block Status Byte     | ECC Field-1           |
| 262      | Block Address Field-1 |                       |
| 263      |                       |                       |

**Fig. 2-4 Page Data in the Data Area (256+8 Bytes/Page Models, Flash Memory)**

**For the 512+16 Bytes/page models (Flash Memory):**

The internal data configurations of the data area are shown in Fig. 2-5.

Both the data and redundant areas in normal blocks on which no data has been written yet are set to “FFh”.

- Storing Area

| Byte No. | All pages      |
|----------|----------------|
| 0-255    | Storing Area-1 |
| 256-511  | Storing Area-2 |

- Redundant area

| Byte No. | All pages             |
|----------|-----------------------|
| 512      | Reserved Field        |
| 513      |                       |
| 514      |                       |
| 515      |                       |
| 516      | Data Status Byte      |
| 517      | Block Status Byte     |
| 518      | Block Address Field-1 |
| 519      |                       |
| 520      | ECC Field-2           |
| 521      |                       |
| 522      |                       |
| 523      | Block Address Field-2 |
| 524      |                       |
| 525      | ECC Field-1           |
| 526      |                       |
| 527      |                       |

**Fig. 2-5 Page Data in the Data Area (512+16 Bytes/Page Models, Flash Memory)**

**For the 512+16 Bytes/page models (MASK ROM):**

The internal data configurations of the data area are shown in Fig. 2-6.

**• Storing Area**

| Byte No. | All pages      |
|----------|----------------|
| 0-255    | Storing Area-1 |
| 256-511  | Storing Area-2 |

**• Redundant area**

| Byte No. | All pages   |
|----------|-------------|
| 512      | FFh (fixed) |
| 513      | FFh (fixed) |
| 514      | FFh (fixed) |
| 515      | FFh (fixed) |
| 516      | FFh (fixed) |
| 517      | FFh (fixed) |
| 518      | FFh (fixed) |
| 519      | FFh (fixed) |
| 520      | FFh (fixed) |
| 521      | FFh (fixed) |
| 522      | FFh (fixed) |
| 523      | FFh (fixed) |
| 524      | FFh (fixed) |
| 525      | FFh (fixed) |
| 526      | FFh (fixed) |
| 527      | FFh (fixed) |

**Fig. 2-6 Page Data in the Storing Area (512+16 Bytes/Page Models, MASK ROM)**



### 1. Storing Area-1

Of the 512-byte data, the first half (which is made up of byte 0 through byte 255) is stored.

### 2. Storing Area-2

Of the 512-byte data, the second half (which is made up of byte 256 through byte 511) is stored.

### 3. Reserved Field

This field is reserved for extensions. The default value is “FFFFFFFFh”.

### 4. Data Status Byte

This area indicates that “Storing Area-1” and “Storing Area-2” are not correct.

Under correct conditions, this is set to “FFh”. If correct data is not written in the data area, “00h” is set.

If four or more bits are “0”, the data shall be assumed to be synonymous with “00h”.

### 5. Block Status Byte

The data in this area indicates whether the block is in order or in error.

Normally, “FFh” is written. If the block is defective, “00h” (indicative of an early-failure block) or “F0h” (indicative of a late-failure block) is set. If two or more bits are “0”, the block shall be judged to be a defective block.

Within the same block, the same value is written for this data.

*Note: “Block Status Byte” shows whether the block is physically valid while the “Data Status Byte” shows whether the data that is written is correct.*

### 6. Block Address Field-1

The data in this area indicates address information for the conversion table to be consulted for block-logical-address to physical-address conversions.

Within the same block, the same value is written for this data.

| D7  | D6  | D5  | D4  | D3  | D2  | D1  | D0  | 256+8 Byte/page                                                 | 512+16 Byte/page |
|-----|-----|-----|-----|-----|-----|-----|-----|-----------------------------------------------------------------|------------------|
| 0   | 0   | 0   | 1   | 0   | BA9 | BA8 | BA7 | 262 Bytes (Even-numbered page)<br>259 Bytes (Odd-numbered page) | 518, 523 Bytes   |
| BA6 | BA5 | BA4 | BA3 | BA2 | BA1 | BA0 | P   | 263 Bytes (Even-numbered page)<br>260 Bytes (Odd-numbered page) | 519, 524 Bytes   |

1–16 MBytes: BA9–BA0: Block Addresses (Value = 0–“Max Logical Blocks - 1”)

32–128 MBytes: BA9–BA0: Block Addresses (Value = 0–999)

P: Even parity bit

Block addresses referred to here represent addresses in the form of data segments after logical addresses have been separated by individual erasure blocks. A 4 kByte separation is adopted for the 256+8 Bytes/page models, while an 8 kByte separation is adopted for the 512+16 Bytes/page models of 4 and 8 MBytes, and a 16 kByte separation is adopted for models of 16MBytes.

## **7. Block Address Field-2**

The data written in this area is identical to the contents of the Block Address Field- 1.

## **8. ECC Field-1**

For the 256+8 bytes/page models, this area contains a 3-byte ECC for the even-numbered page data (made up of 256 bytes).

For the 512+16 bytes/page models, this area contains a 3-byte ECC for page data from byte 0 through byte 255 (made up of 256 bytes). For details on ECCs, see Appendix 3.

## **9. ECC Field-2**

For the 256+8 bytes/page models, this area contains a 3-byte ECC for the odd-numbered page data (made up of 256 bytes).

For the 512+16 bytes/page models, this area contains a 3-byte ECC for page data from byte 256 through byte 511 (made up of 256 bytes). For details on ECCs, see Appendix 3.

### **Notes:**

In a Flash Memory device, there might be a logical block that is not allocated to a physical block due to the block not being used. All data returned should be set to “FFh” when accessing this logical block.

## <Appendix 1>

### • CIS Fields

These areas store the data necessary to judge whether the formatting has been carried out in accordance with this Physical Format Specification. The data is based on the CIS (Card Information Structure) of PC cards.

\* 0000h–0054h: These values should not be changed by users. (fixed)  
(0000h–0009h are used to judge the format specification.)

\* 0055h–007Fh: Some of these values can be changed by users.

Table A-1 shows default values that have been set in CIS fields. Actual on-memory addresses can be calculated by adding the start address of a given CIS field to each individual address shown in the table below.

**Table A-1 CIS Area Default Values**

| Addr  | +0  | +1  | +2  | +3  | +4  | +5  | +6  | +7  |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|
| 0000h | 01h | 03h | D9h | 01h | FFh | 18h | 02h | DFh |
| 0008h | 01h | 20h | 04h | 00h | 00h | 00h | 00h | 21h |
| 0010h | 02h | 04h | 01h | 22h | 02h | 01h | 01h | 22h |
| 0018h | 03h | 02h | 04h | 07h | 1Ah | 05h | 01h | 03h |
| 0020h | 00h | 02h | 0Fh | 1Bh | 08h | C0h | C0h | A1h |
| 0028h | 01h | 55h | 08h | 00h | 20h | 1Bh | 0Ah | C1h |
| 0030h | 41h | 99h | 01h | 55h | 64h | F0h | FFh | FFh |
| 0038h | 20h | 1Bh | 0Ch | 82h | 41h | 18h | EAh | 61h |
| 0040h | F0h | 01h | 07h | F6h | 03h | 01h | EEh | 1Bh |
| 0048h | 0Ch | 83h | 41h | 18h | EAh | 61h | 70h | 01h |
| 0050h | 07h | 76h | 03h | 01h | EEh |     |     |     |

(Note 1), (Note 2)

|       |     |     |     |     |
|-------|-----|-----|-----|-----|
| 0055h | 15h | 14h | 05h | 00h |
|-------|-----|-----|-----|-----|

- Name of Manufacture (' ' 7 characters is preferable)

|       |     |     |     |     |     |     |     |     |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|
| ..... | 20h | 20h | 20h | 20h | 20h | 20h | 20h | 00h |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|

- Name of Product (' ' 4 characters is preferable)

|       |     |     |     |     |     |
|-------|-----|-----|-----|-----|-----|
| ..... | 20h | 20h | 20h | 20h | 00h |
|-------|-----|-----|-----|-----|-----|

- Product Version ('0.0' 3 characters is preferable)

|       |     |     |     |     |     |
|-------|-----|-----|-----|-----|-----|
| ..... | 30h | 2Eh | 30h | 00h | FFh |
|-------|-----|-----|-----|-----|-----|

|       |     |     |     |     |               |
|-------|-----|-----|-----|-----|---------------|
| ..... | 14h | 00h | FFh | 00h | 00h ..... 00h |
| 007Fh | 00h |     |     |     |               |

Note 1: Only the half-toned areas can be changed.

Note 2: The values change due to the number of characters in Manufacturer Name, Product Name, and Product Version.

“The number of characters within the area surrounded by broken lines + 2” is set.

Note 3: Only the contents and the number of characters can be changed for the Manufacturer Name, Product Name, and Product Version.

## <Appendix 2>

### • Identify Drive Information Field

These areas are specified as the accessible data area to the ATA-interface-equipped host system. The default value is “00h.”

The Identify Drive Information (Identify Device Information) is an ATA-interface command. The Identify Drive Information Area stores portions of the data that is returned to the host system using this command.

**Table A-2 Identify Drive Information Field**

| Identify Drive Information Word Address | Identify Drive Information | 256+8 Bytes/Page                                                        | 512+16 Bytes/Page              |
|-----------------------------------------|----------------------------|-------------------------------------------------------------------------|--------------------------------|
| 7,8,9 Word Address                      | Vendor Unique              | 128–133 Bytes (Even-numbered page)<br>128–133 Bytes (Odd-numbered page) | 128–133 Bytes<br>384–389 Bytes |
| 10-19 Word Address                      | Serial Number              | 134–153 Bytes (Even-numbered page)<br>134–153 Bytes (Odd-numbered page) | 134–153 Bytes<br>390–409 Bytes |
| 27-46 Word Address                      | Model Number               | 154–193 Bytes (Even-numbered page)<br>154–193 Bytes (Odd-numbered page) | 154–193 Bytes<br>410–449 Bytes |
| 128-158 Word Address                    | Vendor Unique              | 194–255 Bytes (Even-numbered page)<br>194–255 Bytes (Odd-numbered page) | 194–255 Bytes<br>450–511 Bytes |

## <Appendix 3>

### • ECC scheme

In the case of the ECC scheme adopted for this Format Specification, 22 bits of ECC (Error Correction Code) are added for every 256 bytes of the Storing area. ECC Field-1 and ECC Field-2 are used for Storing Area-1 and Storing Area-2, respectively.

The ECC scheme is capable of single-bit correction and 2-bit random-error detection. ECCs are generated only for data areas and no ECC is generated for page-data redundant areas containing ECCs. This is because the data in the page-data redundant area is duplicated for reliability and this duplication (redundancy) provides a means of checking the integrity of the data. For ECC calculations, 256 bytes are handled in the form of 2048-bit serial data. In the event of an error, the error-correction feature can detect the bit location of the error that has occurred based on the results of a parity check and correct the data.

### • Definition of the Location Addresses of 2048-Bit Serial Data

256 bytes are arranged in a serial-data format or a single stream of bits.

|            | bit 7        | bit 6        |  |  |  | bit 1        | bit 0        |
|------------|--------------|--------------|--|--|--|--------------|--------------|
| 1st Byte   | 00000000 111 | 00000000 110 |  |  |  | 00000000 001 | 00000000 000 |
| 2nd Byte   | 00000001 111 | 00000001 110 |  |  |  | 00000001 001 | 00000001 000 |
|            |              |              |  |  |  |              |              |
| 255th Byte | 11111110 111 | 11111110 110 |  |  |  | 11111110 001 | 11111110 000 |
| 256th Byte | 11111111 111 | 11111111 110 |  |  |  | 11111111 001 | 11111111 000 |

In the above diagram, the top row represents the first byte input and the bottom row represents the 256th byte input. In other words, Bit 0 of the first byte becomes the first bit (whose address is 00000000 000) of the 2048-bit stream while bit 7 of the 256th byte becomes the 2048th bit (address = 11111111 111) of the 2048-bit stream.

### • Generation of Parity Data

There are a total of 22 bits of parity data (6 bits for column parity and 16 bits for line parity) as follows: CP0, CP1, CP2, CP3, CP4, CP5, LP00, LP01, LP02, LP03, ..., LP14, and LP15. The parity data that have been generated are stored in the page-data redundant area in the order shown below:

**Table A-3 ECC Data Arrangement**

| bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 | 256+8 Bytes/Page | 512+16 Bytes/Page |
|------|------|------|------|------|------|------|------|------------------|-------------------|
| LP07 | LP06 | LP05 | LP04 | LP03 | LP02 | LP01 | LP00 | 256, 261 Bytes   | 520, 525 Bytes    |
| LP15 | LP14 | LP13 | LP12 | LP11 | LP10 | LP09 | LP08 | 257, 262 Bytes   | 521, 526Bytes     |
| CP5  | CP4  | CP3  | CP2  | CP1  | CP0  | "1"  | "1"  | 258, 263 Bytes   | 522, 527Bytes     |

Line parity (LP) and column parity (CP) represent 1024-bit odd parity. Each parity data satisfies the corresponding condition shown below:

|                           |                       |
|---------------------------|-----------------------|
| LP00 = D (*****0 , ***)   | CP0 = D (***** , **0) |
| LP01 = D (*****1 , ***)   | CP1 = D (***** , **1) |
| LP02 = D (*****0* , ***)  | CP2 = D (***** , *0*) |
| LP03 = D (*****1* , ***)  | CP3 = D (***** , *1*) |
| LP04 = D (*****0** , ***) | CP4 = D (***** , 0**) |
| LP05 = D (*****1** , ***) | CP5 = D (***** , 1**) |
| LP06 = D (****0*** , ***) |                       |
| LP07 = D (****1*** , ***) |                       |
| LP08 = D (***0**** , ***) |                       |
| LP09 = D (***1**** , ***) |                       |
| LP10 = D (**0***** , ***) |                       |
| LP11 = D (**1***** , ***) |                       |
| LP12 = D (*0***** , ***)  |                       |
| LP13 = D (*1***** , ***)  |                       |
| LP14 = D (0***** , ***)   |                       |
| LP15 = D (1***** , ***)   |                       |

Where \* represents “0” or “1”.

## <Appendix 4>

Default values that are set in the CIS/IDI Field are shown in Tables A-4 and A-5.

**Table A-4 CIS/Identify Drive Information Default Data for the 256+8 Bytes/page models**

• Even-numbered page

|      |     |      |                                                 |
|------|-----|------|-------------------------------------------------|
| Data | Adr | 000h | 01 03 d9 01 ff 18 02 df 01 20 04 00 00 00 00 21 |
| Data | Adr | 010h | 02 04 01 22 02 01 01 22 03 02 04 07 1a 05 01 03 |
| Data | Adr | 020h | 00 02 0f 1b 08 c0 c0 a1 01 55 08 00 20 1b 0a c1 |
| Data | Adr | 030h | 41 99 01 55 64 f0 ff ff 20 1b 0c 82 41 18 ea 61 |
| Data | Adr | 040h | f0 01 07 f6 03 01 ee 1b 0c 83 41 18 ea 61 70 01 |
| Data | Adr | 050h | 07 76 03 01 ee 15 14 05 00 20 20 20 20 20 20 20 |
| Data | Adr | 060h | 00 20 20 20 20 00 30 2e 30 00 ff 14 00 ff 00 00 |
| Data | Adr | 070h | 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| Data | Adr | 080h | 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| Data | Adr | 090h | 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| Data | Adr | 0a0h | 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| Data | Adr | 0b0h | 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| Data | Adr | 0c0h | 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| Data | Adr | 0d0h | 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| Data | Adr | 0e0h | 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| Data | Adr | 0f0h | 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| Data | Adr | 100h | ff ff ff ff ff ff ff 00 00                      |

• Odd-numbered page

|      |     |      |                                                 |
|------|-----|------|-------------------------------------------------|
| Data | Adr | 000h | 01 03 d9 01 ff 18 02 df 01 20 04 00 00 00 00 21 |
| Data | Adr | 010h | 02 04 01 22 02 01 01 22 03 02 04 07 1a 05 01 03 |
| Data | Adr | 020h | 00 02 0f 1b 08 c0 c0 a1 01 55 08 00 20 1b 0a c1 |
| Data | Adr | 030h | 41 99 01 55 64 f0 ff ff 20 1b 0c 82 41 18 ea 61 |
| Data | Adr | 040h | f0 01 07 f6 03 01 ee 1b 0c 83 41 18 ea 61 70 01 |
| Data | Adr | 050h | 07 76 03 01 ee 15 14 05 00 20 20 20 20 20 20 20 |
| Data | Adr | 060h | 00 20 20 20 20 00 30 2e 30 00 ff 14 00 ff 00 00 |
| Data | Adr | 070h | 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| Data | Adr | 080h | 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| Data | Adr | 090h | 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| Data | Adr | 0a0h | 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| Data | Adr | 0b0h | 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| Data | Adr | 0c0h | 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| Data | Adr | 0d0h | 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| Data | Adr | 0e0h | 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| Data | Adr | 0f0h | 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| Data | Adr | 100h | 0c cc c3 00 00 0c cc c3                         |

**Table A-5 CIS/Identify Drive Information Default Data for the 512+16 Bytes/page models**

|      |     |      |                                                 |
|------|-----|------|-------------------------------------------------|
| Data | Adr | 000h | 01 03 d9 01 ff 18 02 df 01 20 04 00 00 00 00 21 |
| Data | Adr | 010h | 02 04 01 22 02 01 01 22 03 02 04 07 1a 05 01 03 |
| Data | Adr | 020h | 00 02 0f 1b 08 c0 c0 a1 01 55 08 00 20 1b 0a c1 |
| Data | Adr | 030h | 41 99 01 55 64 f0 ff ff 20 1b 0c 82 41 18 ea 61 |
| Data | Adr | 040h | f0 01 07 f6 03 01 ee 1b 0c 83 41 18 ea 61 70 01 |
| Data | Adr | 050h | 07 76 03 01 ee 15 14 05 00 20 20 20 20 20 20 20 |
| Data | Adr | 060h | 00 20 20 20 20 00 30 2e 30 00 ff 14 00 ff 00 00 |
| Data | Adr | 070h | 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| Data | Adr | 080h | 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| Data | Adr | 090h | 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| Data | Adr | 0a0h | 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| Data | Adr | 0b0h | 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| Data | Adr | 0c0h | 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| Data | Adr | 0d0h | 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| Data | Adr | 0e0h | 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| Data | Adr | 0f0h | 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| Data | Adr | 100h | 01 03 d9 01 ff 18 02 df 01 20 04 00 00 00 00 21 |
| Data | Adr | 110h | 02 04 01 22 02 01 01 22 03 02 04 07 1a 05 01 03 |
| Data | Adr | 120h | 00 02 0f 1b 08 c0 c0 a1 01 55 08 00 20 1b 0a c1 |
| Data | Adr | 130h | 41 99 01 55 64 f0 ff ff 20 1b 0c 82 41 18 ea 61 |
| Data | Adr | 140h | f0 01 07 f6 03 01 ee 1b 0c 83 41 18 ea 61 70 01 |
| Data | Adr | 150h | 07 76 03 01 ee 15 14 05 00 20 20 20 20 20 20 20 |
| Data | Adr | 160h | 00 20 20 20 20 00 30 2e 30 00 ff 14 00 ff 00 00 |
| Data | Adr | 170h | 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| Data | Adr | 180h | 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| Data | Adr | 190h | 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| Data | Adr | 1a0h | 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| Data | Adr | 1b0h | 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| Data | Adr | 1c0h | 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| Data | Adr | 1d0h | 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| Data | Adr | 1e0h | 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| Data | Adr | 1f0h | 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
|      |     |      |                                                 |
| Data | Adr | 200h | ff ff ff ff ff ff 00 00 0c cc c3 00 00 0c cc c3 |
|      |     |      | (Flash Memory)                                  |
| Data | Adr | 200h | ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff |
|      |     |      | (MASK ROM)                                      |



**<Appendix 5>**

The Technical Committee of the SSFDC Forum recommends the DOS format be used as the logical format that precedes the physical format layer. For the DOS format, please refer to the “SmartMedia™ Logical Format Specification,” and others.

The parameters that are required for the DOS format are shown in Table A-6.

**Table A-6 Logical Format Parameters**

| Model    | Cylinders | Heads/track | Sectors/head | Total sector count |
|----------|-----------|-------------|--------------|--------------------|
| 1 MByte  | 125       | 4           | 4            | 2,000              |
| 2 MBytes | 125       | 4           | 8            | 4,000              |
| 4 MBytes | 250       | 4           | 8            | 8,000              |
| 8 MBytes | 250       | 4           | 16           | 16,000             |